

PhD fellow in Neuromorphic computation for robots

IIT invites excellent candidates to apply to its PhD program organized in collaboration with the Open University; this international PhD program confers Doctorates in *Health, Sustainable and Human Technologies*.

In order to be admitted into the ARC program, the minimum requirements are

- i. a Masters-level degree, which broadly corresponds to a 4/5-year undergraduate MSc/MChem/Meng-style degree or to a postgraduate Masters in the British system, or to a second level University degree in Italy;
- ii. a grade corresponding to an upper second class (2.1) or a merit in the UK system or 100/110 in the Italian system. Candidates with lower grades but redeeming features (publications, specific expertise) are requested to contact the potential supervisors before applying;
- iii. where English is not the applicant's first language, a valid IELTS (International English Language Testing System) certificate. The minimum acceptable score is an overall 6.5, with no less than 6.0 in any of the four categories

One PhD fellow position **will be available from April 1st 2025** in the [Event-Driven Perception for Robotics](#) research line led by its supervisor, Dr. [Chiara Bartolozzi](#).

Title of the project: Online brain-inspired computation to generate robust behaviour for humanoid robots

Background: Neuromorphic sensing and computation can be used to design low-latency perception for robots [1,2]. To fully exploit the low-latency and low-power paradigm, we aim at designing end-to-end spiking robotic systems, relying on event-driven sensory encoding, neuromorphic computation, and spiking motor control [3], all implemented on neuromorphic hardware [4].

Description: The neuromorphic iCub is equipped with neuromorphic vision, auditory and tactile sensors, and with neuromorphic processors. We will use it as an experimental platform to study and implement brain-inspired computation to generate robust behaviour, using limited and noisy resources. Among the possible research directions, we will explore the use of spiking neural networks, coupled with event-driven heterogeneous sensing, for action understanding, trajectory generation and coordinate transformations. The spiking neural networks will be tailored to work on neuromorphic hardware and to work online on the iCub.

External References:

- [1] D'Angelo G. et al., Event driven bio-inspired attentive system for the iCub humanoid robot on SpiNNaker, IOP Neuromorphic Computing and Engineering, DOI: 10.1088/26344386/ac6b50
- [2] Gava L., et al. How Late is too Late? A Preliminary Event-based Latency Evaluation, EBCCSP 2022, DOI: 10.1109/EBCCSP56922.2022.9845622
- [3] Zhao J. et al. Learning Inverse Kinematics using Neural Computational Primitives on Neuromorphic Hardware DOI: <https://doi.org/10.21203/rs.3.rs-2220673/v1>
- [4] Bartolozzi C., Indiveri G., Donati E., Embodied neuromorphic intelligence, Nature Communications, DOI: 10.1038/s41467-022-28487-2

Main Supervisor: [Chiara Bartolozzi](#). ([Event-Driven Perception for Robotics](#))

Essential expertise:

- i. Degree in Computer Science, Engineering, or related disciplines.
- ii. Neuromorphic Engineering, or Computational Neuroscience.
- iii. Computer programming skills with C++ and/or Python
- iv.

Desirable expertise:

- i.
- ii.
- iii.

How to apply. Prospective students must submit using the [online form](#) the following documents

- 1) 2-page CV, which includes studies, expertise and achievements.
- 2) 1-page research statement, which includes the choice of a project from the list above and a justification of the choice. Only if robustly justified, the student may signal their interest also for a second project, but there is no guarantee that this will be taken into account by the selection panel.
- 3) A transcript of undergraduate and postgraduate studies.
- 4) A valid IELTS certificate, obtained no more than two years before the proposed registration date.
- 5) Contact details of two referees.

Deadline for application: 22nd December 2024, 13:00, GMT+1

Istituto Italiano di Tecnologia, with its headquarters in Genoa, Italy, is a non-profit institution with the primary goal of creating and disseminating scientific knowledge and strengthening Italy's technological competitiveness. IIT's research endeavour focuses on high-tech and innovation, representing the forefront of technology with possible application from medicine to industry, computer science, robotics, life sciences and nanobiotechnologies.

Istituto Italiano di Tecnologia is an Equal Opportunity Employer that actively seeks diversity in the workforce.

Please note that the data that you provide will be used exclusively for the purpose of professional profiles' evaluation and selection, and in order to meet the requirements of Istituto Italiano di Tecnologia. Your data will be processed by Istituto Italiano di Tecnologia, based in Genoa, Via Morego 30, acting as Data Controller, in compliance with the rules on protection of personal data, including those related to data security.